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AUTHOR Price, Charles L.
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ABSTRACT

Project PHOTO provides a format for middle school students to learn about photography with three different types of techniques: sun prints, can cameras, and pinhole cameras. Additional topics and activities include film developing, contact prints and enlarging, history of photography, photographic composition, types of cameras, a photography word find, constructing and equiping a darkroom, prices of supplies, evaluation, and a short bibliography. Lesson plans are provided which include cognitive, affective, and psychomotor objectives, motivational techniques, specific procedures, formative and summative evaluation, list of materials, and typical questions to ask students. (DS)

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A PHOTOGRAPHY PRIMER

FOR

MIDDLE SCHOOL STUDENTS AND TEACHERS

Prepared for:
National Science Teachers Association
National Meeting
New York, New York
April 3, 1981

Presented by:

Charles L. Price, Ph.D.
Professor of Science Education
Indiana State University Evansville
Evansville, Indiana 47712

INDIANA
STATE
UNIVERSITY
EVANSVILLE

SE 035 837

ACKNOWLEDGEMENTS

I would like to express my appreciation to those who enabled PROJECT PHOTO to become reality. Specifically, the teachers and administrators of Daniel Wertz Elementary School, Perry Heights Elementary School, and West Terrace Elementary School, all of Evansville, Indiana exhibited outstanding patience and flexibility in the initial field testing phase.

The unit components of PROJECT PHOTO were developed by the following science education students at ISUE: Karen Abbot, Don DeWeese, Becky Duncan, John Eifler, Marsha Fitch, Linda Foyer, Patty Frayer, Kristie French, Betsy Hall, Joy Hyneman, Marla Jenny, Jan Kellen, Sonya Kirwer, Tammy Koch, Maryann Kotyuk, Christy Nodarse, Donna Sickbert, Cindy Sprosty, Patty Wagner and Chris Westerman.

Finally, it would be inappropriate not to thank our "board of experts"--the elementary school children who participated in the project. Their enthusiasm and comments were greatly appreciated.

WHAT PROJECT PHOTO WAS ALL ABOUT

I have yet to meet a person (child or adult) who was not excited when the image on his first photo appeared in the darkroom tray. The desire to see this excitement in students' faces is what inspired PROJECT PHOTO.

The rationale behind this project is that, basically, photography is simple. First off, students take photos (sun prints) without a camera. This technique shows outlines but no features. Good quality photographs can be obtained from the can camera constructed from an oatmeal box. For those who wish to take photographs which may be enlarged, pinhole (film) camera construction is explained. Additional topics on photographic composition, history of photography, and types of cameras are provided and may be included in a photography unit if so desired.

Sample evaluation questions and a unit checklist are also provided. The bibliography which is appended to this paper lists some excellent free publications from Kodak as well as good articles on photography units for middle school grades.

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PROJECT PHOTO*

Science Education Field Experience

West Terrace Elementary School

Date	Topic(s)
April 14	Sun Prints History--Part I Needed: Bring cans for can cameras
April 16	Can Cameras--Build and Take photo Develop Photo History--Part II
April 21	Developing Paper--Theory, Positive from negative Pinhole Camera--Construction Composition--Story Telling History--Part III
April 23	Finish Construction of Pinhole Camera Types of Cameras--Part I Developing Film History--Part IV
April 28	Contact Prints, Enlargements Composition--Examples of photos Types of Cameras--Part II History--Part V
April 30	Enlargements History--if needed Final Evaluation

* This timetable was used in a field test of the materials.

SUN PRINTS

I. OBJECTIVES

A. Cognitive

After instruction the student will be able to:

1. explain that opaque objects are best, because the paper beneath the object will not be exposed.
2. compare the prints on ozalid paper to those on blue print, to determine which has a light image on a dark background and which has the reverse.
3. explain what chemical or chemical solution is needed to develop each print.

B. Affective

The student will show an appreciation for photographs made without a camera or darkroom.

C. Psychomotor

After instruction the student will be able to:

1. demonstrate the steps for exposing an object on ozalid and blueprint paper.
2. demonstrate the steps for developing prints on ozalid and blueprint paper.

II. MOTIVATION

Most people think a camera and a darkroom are necessary for making photographs. Today we are going to make photographs without either of these things. These photographs are called sun prints. (Don) (Karen show examples)

III. PROCEDURE

1. Ozalid Paper - Choose an opaque object. (Explain this term)
2. Place the object on the yellow side of the paper and lay the paper in the light, quickly letting go.
3. The sun or light will act on this sensitive paper everywhere except under the opaque object.
4. Expose the paper to direct sunlight for 30-60 seconds, or to inside light for minutes.
5. Pick up the paper and shield it from light, putting it in the developing jar as quickly as possible.
6. The same procedure is used for exposing the blueprint paper.
7. For developing the <u>ozalid</u> paper, pour enough ammonia into a gallon jar to cover the bottom.
8. Pour 2 cups of sand or gravel into the jar and mix with the ammonia. There should be enough gravel to prevent the ozalid paper from touching the ammonia.
9. After exposing the paper to light, quickly put it into the jar, lidding the jar.
10. Allow the paper to develop until the image appears.
11. For developing the <u>blueprint</u> paper, put a few drops of hydrogen peroxide in a pan of water.
12. After exposing the paper to light, quickly plunge the paper into the pan, for at least one minute, moving it around a little.
13. Remove and let dry in the shade.

IV. Formative Evaluation

What happened when the paper was exposed to light?
What happened when the paper was put in the jar of ammonia?
What happened when the paper was put in the pan of water and peroxide?
How long did it take for each picture to develop?
What happened if an object slipped while in the light?

V. Summary

By carefully following directions, photographs can be made by simply exposing an object on ozalid or blueprint paper to sunlight or inside light, and developing the exposed paper in the correct chemical.

VI. Summary Evaluation (Test Questions)

Short Answer

1. What chemical is used to develop the exposed ozalid paper ? (ammonia)
2. What chemical is used to develop the exposed blueprint paper? (Peroxide)

Multiple choice

1. What type of image is produced on the ozalid paper?
   a. a light image on a light background
   b. a light image on a dark background
   (c.) a dark image on a light background
   d. a dark image on a dark background

2. What type of image is produced on the blueprint paper?
   a. a light image on a light background
   (b.) a light image on a dark background
   c. a dark image on a light background
   dd a dark image on a dark background

True-False

True (False) 1. A camera is needed to make sunprints.
(True) False 2. It is best to make sunprints of opaque objects.
True (False) 3. The part of the paper under the object should be exposed to the light.

VII. Materials

Blueprint Paper
Ozalid Paper
Hydrogen peroxide
Ammonia
Two 1-gallon jars with lids
3-4 cups gravel or sand
2 pans of water
Objects to print

SUN PRINTS

How to use paper:

1. Gather items for your sun print.
2. In your shadow (with your back to the sun), arrange items on the paper. Cover with clear plastic.
3. Step aside and let sun shine on the paper for 40-60 seconds.
4. Develop paper for 60 seconds in . . .

(For Ozalid paper)

(For Blueprint paper)

5. Let paper dry in the shade.

Lesson Plan -- Can cameras

Long Range Objective -- After instructions, each student will be able to construct a can camera and successfully take one photograph.

Materials Needed -- oatmeal boxes (any size), black construction paper, needle (#7), Reynolds aluminum wrap, tape, scissors, razor blade or sharp knife, and Kodak Polycontrast Photographic paper

What we will do --

1. Demonstrate construction of can camera.
2. Define terms necessary to know in constructing and taking pictures with the can camera. Camera must be loaded (with photographic paper) in a darkroom.

   Try this exposure time first:

   sunny days -- 15 seconds

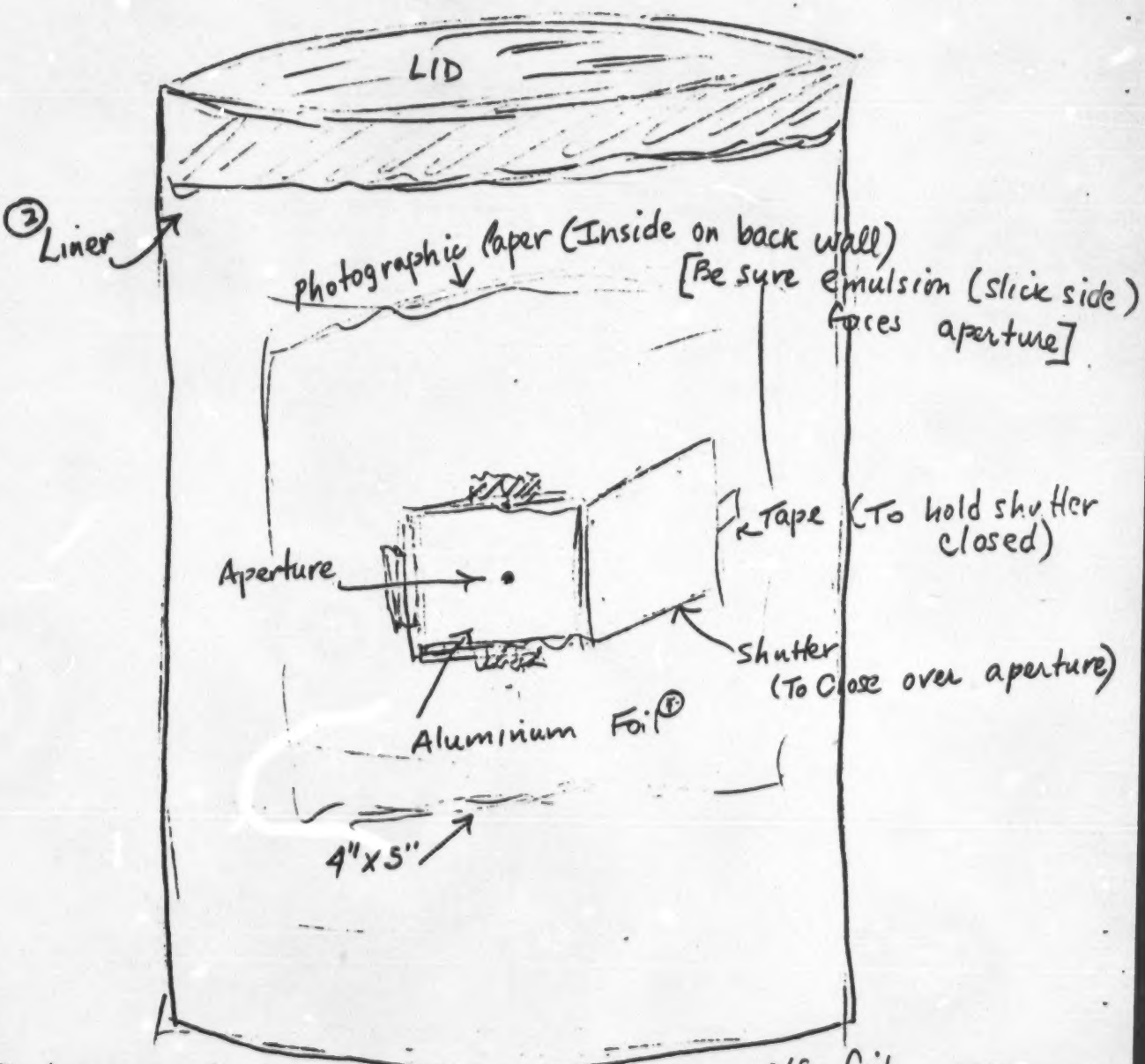
   If picture is too light, double time.

   If picture is too dark, halve time.
3. Explain how can camera works.
4. Explain procedure for taking pictures.

Evaluation --

1. Did each student make a camera?
2. Did each student successfully take a picture?
3. Can students define the following terms? -- aperature, shutter, depth of field, focus, darkroom, light sensitive paper, emulsion side of paper, exposure time, negative and positive prints, simple camera, lighting (front, back, and side)
4. Do the students understand the importance of lightproofing, size of aperature, and exposure time?
5. Do students understand how the can camera operates?

ANATOMY OF THE CAN CAMERA



① Cut a 1"x1" hole in can and cover with foil.

② A black construction paper liner is recommended to reduce internal reflection.

DEVELOPING CAN CAMERA PICTURES

OBJECTIVES

Cognitive:

After instruction the students will be able to:

1. Demonstrate the correct order in which the paper is put into the different solutions.
2. Discover what happens in the developer, and the purpose of each of the other solutions.
3. Compare the lengths of time the paper is left in each solution and be able to explain why there are differences.

Affective:

1. The students will show an appreciation for how photography works and for seeing their own photograph develop into an image.

Psychomotor:

After instruction the students will be able to:

1. Demonstrate how to develop their own photograph from start to finish.
2. Judge how long to develop their photograph for best results and know when to take their photograph out of the developer is it gets too dark.
3. Demonstrate proper use of the tongs by keeping them in the proper solution.

MATERIALS

4 trays (fourth tray is optional)
4 pairs of tongs
chemicals for solutions: developer working solution, stop bath, fixer (or hypo) water
Darkroom with safelight or light tight room
stopwatch or clock with second hand (timer)
paper towels

PROCEDURE

Begin by explaining to the students that when you develop paper, there are certain conditions and procedures that must be followed to ensure a good photograph. First of all, the paper must be developed in a darkroom or a light tight room. A safe light can be used to see what is taking place. Secondly, explain to the students that there are certain materials needed - trays, tongs, chemical for solutions, water, paper towels, timer.

1. Place the trays on the table and fill each one with the appropriate chemical. (1) (Be sure to let the students know how much chemical and how much water is required for each solution).
2. Explain what is in each tray, its pupose, and how long the paper must stay in each of the trays.
3. Place a pair of tongs in each tray. (Stress the fact that each tray must have a separate pair of tongs to keep the solutions free from other chemicals).
   Ask the students what they think might happen if the solutions were to get mixed.
4. Place the paper in the developer, stop bath, and fixer for the proper amounts of time. Use timer or stop watch.
5. Rinse each photograph in water.

(1) Order of Operation - Developer → Stop Bath → Fixer

6.

6. Lay photographs on paper to dry.
7. Compare the pictures that each student took.

The first demonstration of developing paper will be done by the instructors and will take place in the classroom. When the class does the actual developing, they will be expected to develop their own photographs with little help from instructors. They will be expected to time their own work and each child will be responsible for a photograph.

IMPORTANT POINTS TO STRESS

1. It must be very dark to develop paper. The room must be light tight.
2. The paper must be timed in each solution. Don't keep paper in the developer too long, or your photograph will be too dark. - Not unless photo is over exposed
3. Use separate tongs for each tray.
4. When you trasfer the paper from one solution to the next, let your paper drip off, so the chemicals won't mix.
5. When you put your paper in the developer, be sure the emulsion side is up. (slick side) - Not required unless you want to see photo appear.

QUESTIONS TO ASK

1. Why do you use a developer?
2. Why do you use a stop bath?
3. Why do you use a fixer?
4. Why doesn't the photograph darken after it has gone through the developing process?
5. How long did it take for the image to appear on the paper after it was placed in the developer?
6. What does the emulsion side of the paper feel like?
7. What precious metal is used to make photographic paper? (If this wasn't discussed in a previous lesson, it should be discussed in this lesson).
8. What would happen if the room wasn't light tight and the paper was exposed to light while in the developer?

PIN HOLE CAMERA CONSTRUCTION

Objectives:

Cognitive

The student will be able to:

1. construct a pin hole camera → see next two poges. - psychomotor also?
2. know how to wind the film
3. take inside and outside pictures
4. ~~understand~~ why a camera should be light proof
   be able to state

Affective:

1. The student wiil show an appreciateion for the construction of a pin hole camera.

Psychomotor:

The student will

1. take pictures of objects inside and outside
2. make a story of the pictures they have taken

Procedure:

Measure black board into four sections. Fold board and tape edges together. Make a pinhole in the center of aluminum foil. Put foil in the center of black board and tape down the edges. Make a flap to cover the pin hole. Tape board to box. Put the box on cartridge with rubber bands.

When taking pictures open the flap for so many seconds. Close the flap so no light can get in. Then turn the film to the next frame.

Materials:

1 cartridge Kodak Verichrome pan film 126, 1 piece black cardboard 1½ by 53/4 inches, 1 piece black board 1½ by 23/4 inches, opening cut in center, 1 piece aluminum foil 1 inch square, 1 piec black paper 1 inch square, 1 wooden tongue depressor, 2 rubber bands, black masking tape

Questions to ask?

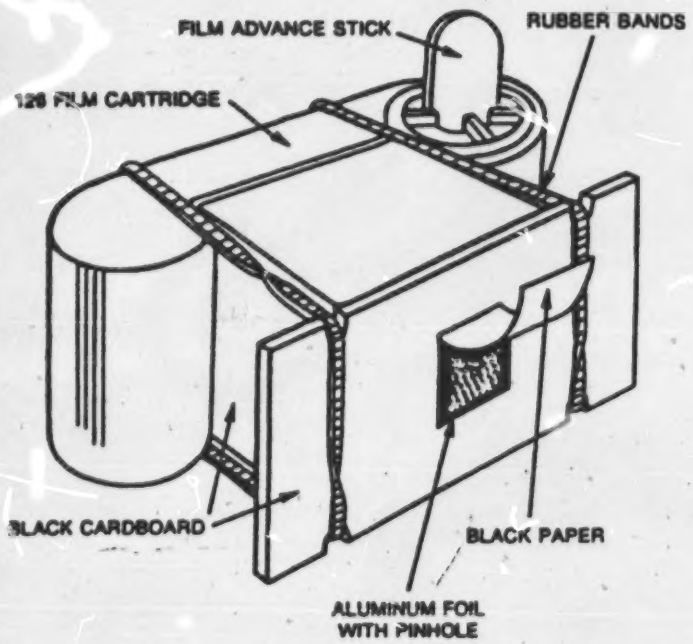
1. How long did it take to take pictures outside?
2. Why did you put a covering over the pinhole?
3. How many times do you turn the film to get to the next frame?
4. Why does the camera have to be light proof?

H. How to Make a Pinhole Camera

This interesting project helps you to understand how a camera works.

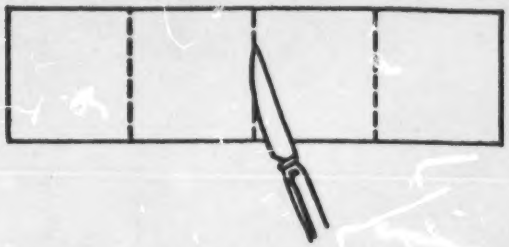
MATERIALS

1 cartridge Kodak Verichrome pan film 126
1 piece black cardboard, 1¼ by 5¾ inches
1 piece black cardboard, 1⅛ by 2¾ inches, with ½-inch square opening cut in center
1 piece aluminum foil, 1-inch square
1 piece black paper, 1-inch square
1 wooden tongue depressor
2 rubber bands
1 No. 10 sewing needle
black masking tape

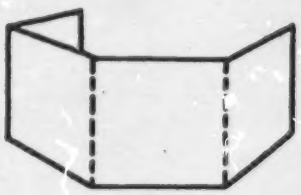


MAKING THE CAMERA

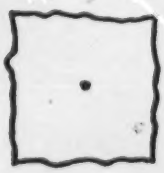
1. Measure and mark the large piece of black cardboard into four sections, each 1-7/16 inches wide.



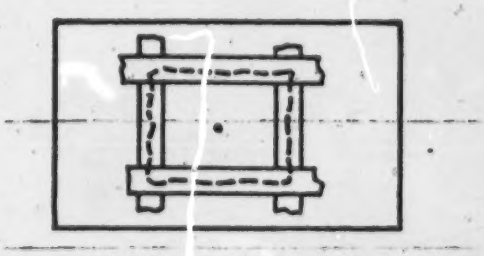
2. Using a knife, cut through the top layer of cardboard along each of the lines. This will make it easier to fold the cardboard. *Don't cut yourself!*



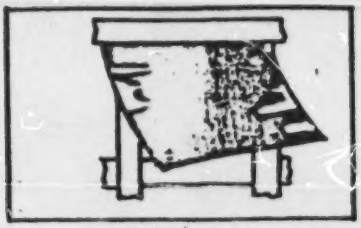
3. Fold the cardboard into a box and tape the edges together with the black tape. This is your camera box.



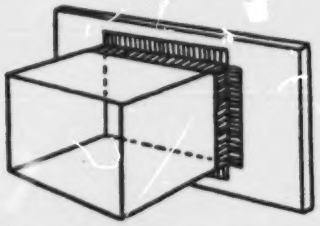
4. Using only the point of the sewing needle, make a very tiny pinhole in the center of the aluminum foil.



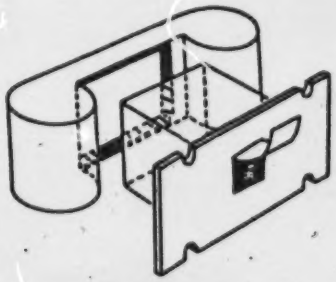
5. Center the pinhole in the foil over the square opening in the small piece of cardboard. Tape the foil to the cardboard on all four edges.



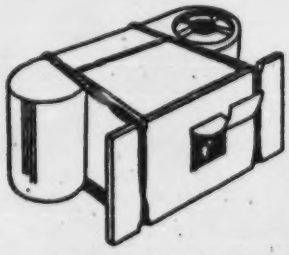
6. Put the small piece of black paper over the pinhole and tape it along the top edge.



7. Tape the small cardboard to the box. Use plenty of tape and make sure all the edges are taped together so no light can get into the camera box.



8. Put the camera box into the square opening in the film cartridge. This should be a tight fit so that no light can get into the camera.



9. Use the two rubber bands to hold the camera and cartridge in place.

10. Trim the wooden stick so that it will fit the round opening in the cartridge and turn the film.

WINDING THE FILM FOR PICTURE-TAKING

When you turn the stick, the yellow paper in the window should move. The film has borders and numbers printed on it. By turning the stick slowly until the third and fourth numbers in each series show in the window, you'll put the film in the proper position for picture-taking.

TAKING THE PICTURE

YOUR CAMERA MUST BE VERY STILL WHILE YOU'RE TAKING A PICTURE. You can't snap pictures as you do with a regular camera. You must keep your camera still by taping it to a rock, car fender, chair, table or windowsill.

To take a picture on sunny days: Uncover the pinhole and count "one-thousand-one, one-thousand-two." Then cover the pinhole.

To take a picture on cloudy days: Uncover the pinhole and count "one-thousand-one, one-thousand-two, one-thousand-three," etc, up to one-thousand-eight. Then cover the pinhole.

Wind the film after taking each picture. After the last picture, wind the film until all the yellow paper has passed the window. Then you can take the camera apart.

HAVING THE FILM DEVELOPED

Take your film to a drugstore or a photo shop for developing. *Do not break open the film cartridge.* Opening the cartridge will ruin your pictures. Send in the whole cartridge for developing. You'll get 12 black-and-white prints from one cartridge of film.

Curiously enough, a tiny pinhole—less than half of a millimeter in diameter—can be used instead of a lens. A pinhole forms an optical image in much the same way as a lens, but the image is less bright than that made by a lens and, therefore, requires a much longer exposure time to record the image.

FILM DEVELOPING*

PURPOSE: To teach students how to develop film.

OBJECTIVES:

Cognitive:

The students will understand the concepts of film developing.

The students will be able to list the supplies and their uses.

The students will know the step-by-step process of film developing.

Psychomotor:

The students will demonstrate loading the film into developing tank.

The students will mix the chemicals.

The students will watch the time and demonstrate agitation every thirty seconds.

Affective:

The students will enjoy film developing.

The students will want to observe and demonstrate more film developing.

The students will desire an accessible darkroom and necessary supplies.

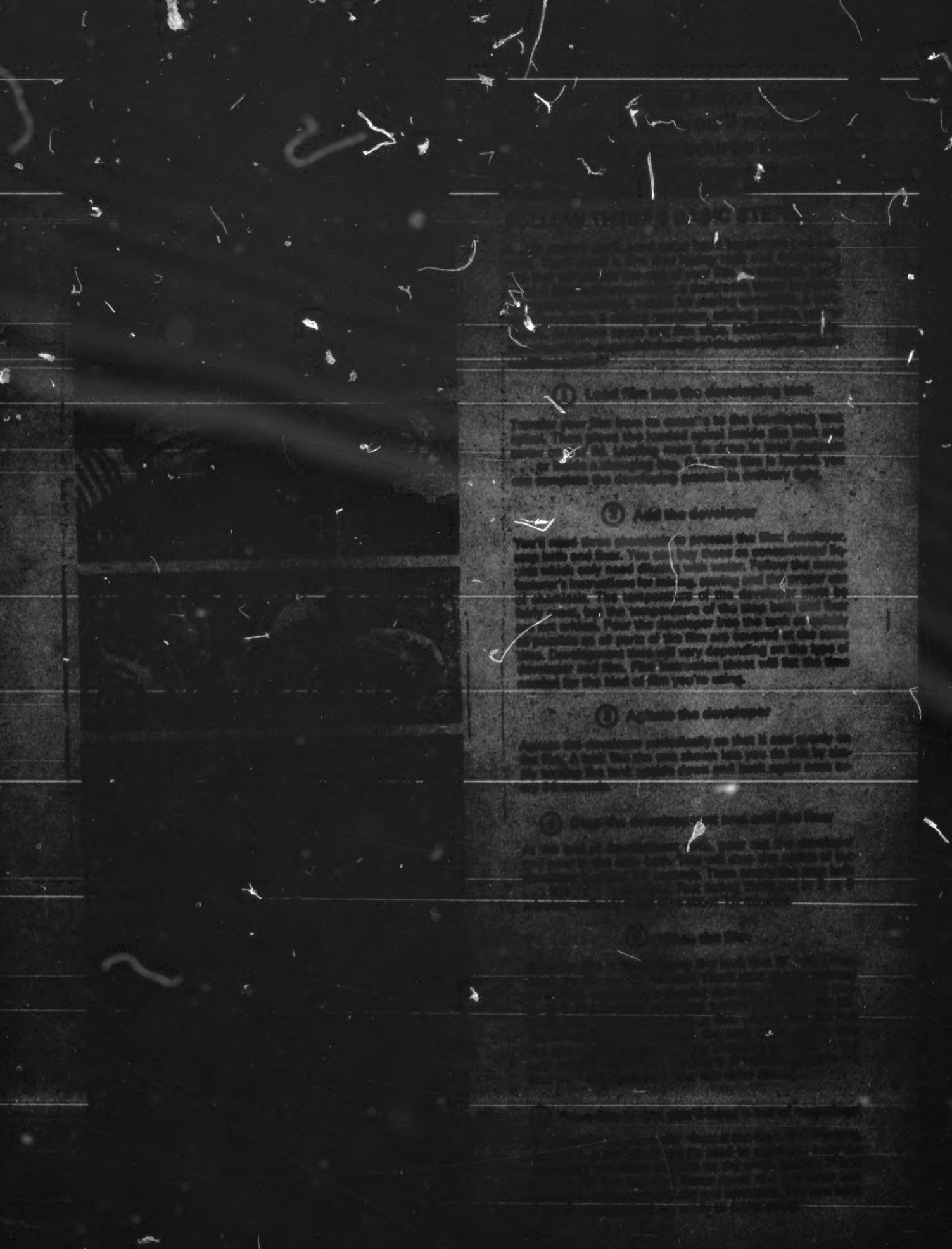
MATERIALS:

exposed film
two film cartridges
Clearing agent
Darkroom
Developer
Developing Tank
Undeveloped Film
Fixing Bath (Hypo)
Safelight
Stop Bath
graduate
thermometer
Quart jars
sponge
timer/watch
scissors
film clips

DEMONSTRATION:

Demonstrate loading of film in developing tank. (Each student will have a turn.)
Demonstrate mixing of chemicals.
Tell importance of timing.
Tell importance of only touching film by the edges.
Go through Step-by-step Process of film developing.
Go over term list.
Develop film in class---students will do much of the work.

* To develop the film exposed by pinhole cameras.



DEVELOPING FILM
Lesson Plan

OBJECTIVES

After instruction the student will be able to:

Cognitive:
1. identify the six steps in developing film
2. state how to load the film onto the reel
3. list the equipment needed for use in the darkroom or the process without a darkroom

Affective:
1. show appreciation for the work we are doing through his participation
2. show respect for our property by taking care of it
3. show enthusiasm for what we are doing by being anxious to follow the procedure in order that the negatives process properly

Psychomotor:
1. demonstrate how to load the film onto the reel
2. make a chart showing the six steps taken in developing the film

PROCEDURE

1. Load the film into the developing tank. Do this in the darkroom or in the changing bag. 2. Add the developer. Follow the instructions on the bottom of the developing tank for the amount of chemicals needed for the type of film you are using. Pour the developer into the tank as quickly as possible so all parts of the film are covered at the same time. 3. Agitate the developer once every 30 seconds by turning the tank upside down and back again. Use a dataguide to see how long you must continue doing this. After the time is up, pour out the developer and rinse the film with water (room temperature). Do this for a few minutes. 4. Add the fixer. Again you must agitate the tank every 30 seconds for a certain amount of time. Pour out the fixer. 5. Wash the film. Add a hypo clearing agent (about 2 drops) to remove excess fixer from the film. 6. Remove the film from the tank. Use a squeegee to remove excess water from the film and to speed up drying. Hang the film up with a clip where it can dry without getting dust on it. You now have a set of negatives. Cut the film into 3-4 frame strips and put into envelopes to help prevent dirt and scratches.

No, This is photo-f it helps film fr streaki and hav water spots

MATERIALS

film, developing tank, changing bag, developer, fixer, hypo clearing agent, watch, water, clip, dataguide

QUESTIONS TO ASK

What would happen if the film was left in the developer too long?

What would happen if the film was not left in the developer long enough?

What would happen if the film was exposed to light?

Where would you find the time needed to develop the film?

Science Education
Dr. Chuck Price
April 8, 1980

Contact Prints, Enlargements

LESSON PLAN

Objectives:

Cognitive

The student will be able to:

1. explain what a contact print is and the process of making one.
2. explain what an enlargement is and the process of making one.
3. define 14 vocabulary words that are listed later in this lesson.

Affective

The student will be able to:

1. show an appreciation for the techniques used in contact printing and enlarging.
2. demonstrate that they are enjoying themselves by the smiles on their faces. — ok!

Psychomotor

The student will be able to:

1. demonstrate the process of making a contact print.
2. demonstrate the process of making an enlargement.

Procedure: Contact Printing

Turn out all of the lights except the darkroom safelight that is equipped with a 15-watt bulb and an amber filter. Place the negative on the base of the enlarger with the dull side facing down. This is the emulsion side of the negative. Next place the photographic paper shiny side (emulsion side) up under the negative. Put the large piece of glass on top of these. Turn on the timer to the desired time which you have already pre-determined. This will turn the light on for the exact time needed.

Procedure: Enlarging

Place the negative into the negative carrier so that the emulsion side (dull) is facing down. Turn on the enlarger light and set the lens at its widest opening (smallest f-number on the lens mount). Then raise and lower the enlarger head and adjust

the easel to get the size and picture composition that you want. Adjust the focus control on the enlarger lens, too. Change the lens opening to f-8 and turn the enlarger light. Place a peice of photographic paper with shiny side up on the easel. Cover all but about ¼ of the paper. Set the timer at 20 seconds and uncover ¼ more after every five seconds has elapsed. This will be what is called a test strip. After developing the test strip, choose the exposure time that you like best. Repeat the process with another peice of photographic paper, setting the timer at the desired setting.

Materials:

darkroom
photographic paper
negative
enlarger
glass
easel
timer
developer, stop bath, and fixer

Questions to ask:

How big are the contact prints?

What should you do if your prints come out too dark? too light?

What would happen if someone opened the door and let the light in?

What does the f-number do?

What is the easel used for?

Which side of the negative is the emulsion side?

Good Questions

Vocabulary:

contact print
negative
enlargement
photographic paper
f-number
easel
emulsion side
safelight
timer
enlarger
enlarger light
test strip
negative carrier
darkroom

Good plans.

PATRICIA WAGNER

HISTORY OF PHOTOGRAPHY

OBJECTIVES:

1. Students will be able to identify some of the pioneers of photography.
2. Students will be able to recognize some of the early cameras used in the development of photography.
3. Students will have an appreciation for the advances made in the development of photography(photographs and cameras).

PROCEDURE:

1. Give brief reports on Matthew Brady, and George Eastman.
2. Bring in pictures of early cameras with brief explanations of each one.
3. Bring in and show class some actual examples of modern day cameras. Explain some of the improvements and/or advantages of the modern day cameras.

QUESTIONS:

1. Matthew Brady was famous for his photographic work during what war? ans: Civil War.
2. Who developed the first Kodak camera? ans: George Eastman.
3. What camera made photography easily available to the public? ans: Kodak Camera.
4. What was the advantage of the Instantograph camera? ans: It could take pictures of moving objects.
5. Which camera produced profile-like figures and eventually evolved into what we know as the photographic camera? ans: Camera obscura.

PHOTOGRAPHIC COMPOSITION

Objectives:

Cognitive

The student will be able to:

1. acknowledge a meaningful arrangement of the parts of a picture so taking pictures becomes more visually satisfying and whole to them.
2. compare different pictures, showing how they are good or bad, and why.
3. demonstrate how pictures tell a story or express a mood through examples.
4. discover how simplicity, framing, and foreground, leading lines, and design all act as important elements in any picture.

Affective:

The students will show an appreciation for different types of pictures, and how pictures tell a story or express a mood.

Psychomotor:

The student will be able to:

1. demonstrate through pictures they have taken or brought in, how pictures tell a story. ← Good Idea
2. make a bulletin board of snapshots and pictures from magazines showing form--simplicity, framing, foreground, leading lines, and design.
3. given a piece of paper with squares on it, (like a picture), demonstrate by drawing horizontal, vertical, triangular, radiating, and diagonal lines, and balanced objects, different types of pictures.

Procedure:

Introduce the word composition and its meaning as related to pictures. Show students good and bad pictures. Tell students about the different lines and balanced objects that compose pictures and show examples of each. Lead into form. Explain different forms and how one's knowlege of form effects their entire picture. Why take pictures? For enjoyment, to express a feeling or mood, for beauty. Every picture tells a story and the story often depends on the individual.

Materials:

Pictures showing form--simplicity, framing, foreground leading lines, design, and horizontal, vertical, diagonal, triangular, radiating lines and balanced objects. Also pictures showing the use of color and star filters, and close-ups, soft focus, still life, nature, and shadows.

Evaluation:

1. They will make a bulletin board showing form.
2. Given a piece of paper with squares on it, they will draw the different lines and the balanced object, showing the different types of pictures.
3. When we show them pictures, they will be able to tell us if they are good or bad.

Questions to ask:

1. Is this picture good or bad, and why?
2. Do you enjoy taking pictures, or is it a bother for you, and why?
3. What does composition mean? (as related to a picture)
4. Tell me the different types of form.

OK //

I think that this will be fine.

TYPES OF CAMERAS

Lesson Plan

Objectives:

Cognitive: After instruction the pupil will be able to identify 5 different types of cameras (box, polaroid, simple adjustable, single lens reflex, twin lens reflex) and tell about each.

Affective: After instruction the pupil will be able to show an appreciation for different types of cameras by paying appention during the presentation.

Psychomotor: After instruction the pupil will beable to make a notebook of ditto's with pictures, information, and questions pertaining to each type of camera.

Procedure:

A presentation of different types of cameras will be given by Cindy using as many different types of cameras possible. Handouts will be make by Donna for each child about cameras.

Materials:

Cameras
Handouts

Evaluation:

The handouts will contain questions to be answered by the students. A word find puzzle will be given to be completed on the students own time or time remaining in the classroom.

What vocabulary should these students master?

BOX OR SIMPLE CAMERA--

Advantages: inexpensive, takes good pictures, simple, will take considerable abuse, best cameras for use by children, instamatics simple to load film.

Disadvantages: fixed lens setting, aperture, and shutter speed prohibit pictures under extreme conditions of lighting and motion, impossible to get shart detail with simple lens.

35MM (MINIATURE OR REGULAR SIZE CAMERA BODY)--

Advantages: light and compact, easy to carry, best camera for candid work, short focal-length lens (usually 50mm) gives good depth of field and makes precise focusing unnecessary for once-in-a-lifetime shot, fastest lenses of any type still cameras, lowest film cost and largest number of exposures per loading (20 or 36 shots per cartridge), highly versatile, wide range of attachments and accessories usually available.

Disadvantages: large film load makes single shoot-and-develop technique impossible (unless you bulk load your own film), enlargements necessary for prints meaning loss of some detail and sharpness, smallest film scratch becomes noticeable on print, parallax problem on close-ups.

TWIN-LENS REFLEX CAMERA--

Advantages: good-size contact prints and fine enlargements possible since negative is of larger size, ground-glass composing and focusing without any mirror movements as in SLR. (Single Lens Reflex).

Disadvantages: parallax at close distance, depth of field cannot be observed, lenses can't be changed in most models, more expensive film.

SINGLE-LENS REFLEX (SLR) 35 MM--

Advantages: same as other 35mm type plus reflex viewing which eliminates parallax completely, high versatility, excellent camera for extreme close-ups and copying.

Disadvantages: same as other 35mm except for parallax.

POLAROID--

Advantages: instant pictures, easy to operate, small number of exposures per roll such that changing from color to black and white is possible at about any time, extremely fast black and white film.

Disadvantages: waste materials (caustic-gooey chemicals) to dispose of (except SX-70), quite expensive per picture, you have no negative which makes it difficult to make extra prints.

THE ANATOMY OF A CAMERA EXPLAINED

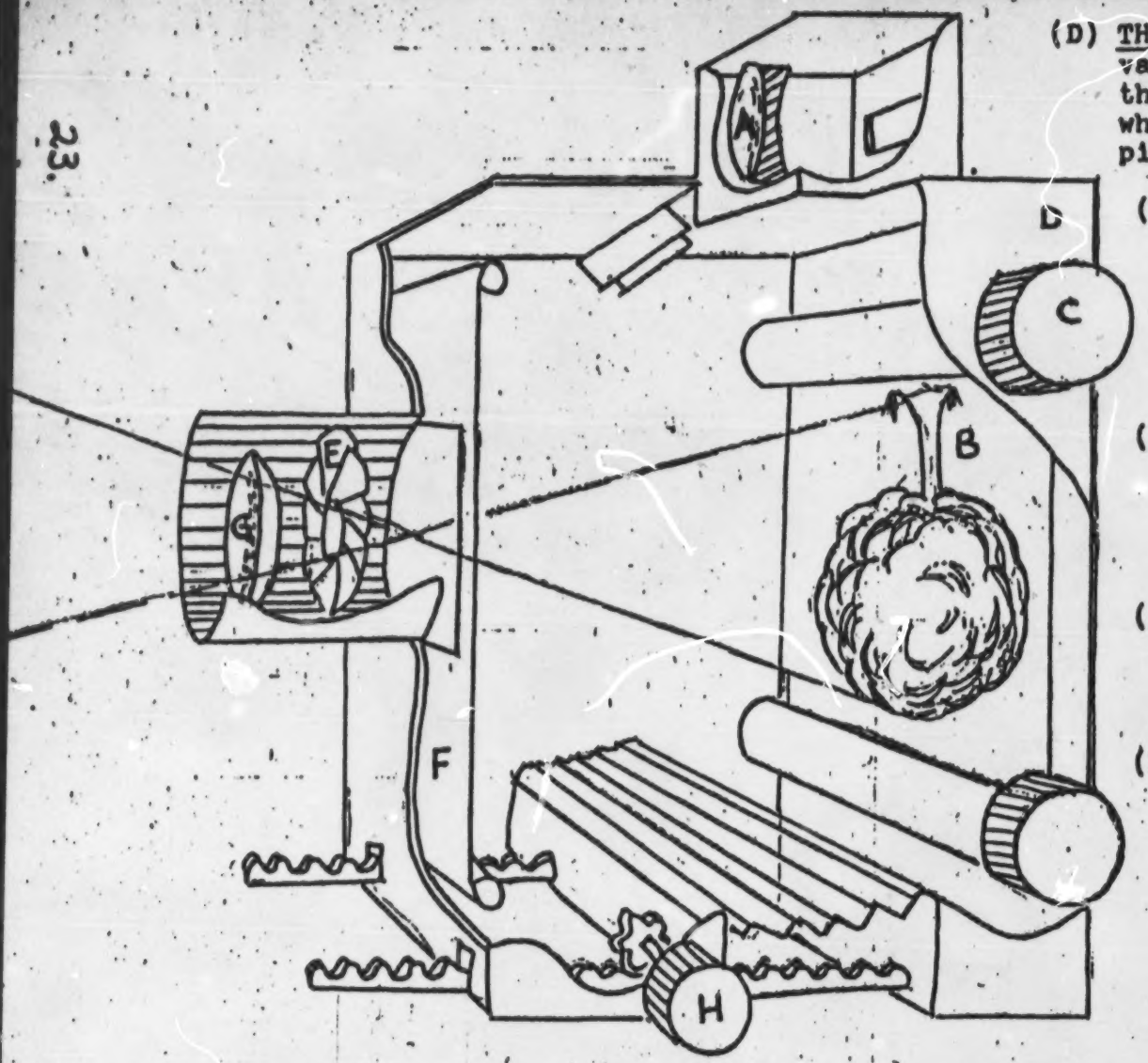
All cameras are basically alike. Each is simply a box with a piece of film in one end and a hole in the other. The hole is there so that light can enter the box, strike the chemically sensitized surface of the film and make a picture. Every model, no matter the cost, works this way. The differences are in how well and how easily they do the job, but the job is always the same: getting light onto film to form an image.

To do the job properly certain things are needed; these are shown in the cut away drawing on the next page. The picture shows; viewing system, film, film advance, camera body, diaphragm, shutter, lens, and focusing control.

All cameras except the very cheapest have all these features in some form. If that is so then why are there so many different kinds of cameras? The reason is that cameras are asked to do so many different things, under such a wide variety of conditions, that they have had to become specialized. A bulky studio camera has features that make it ideal for making indoor pictures, but for unposed pictures, possibly people at a picnic, the studio camera is not as good as a pocket - sized instamatic.

QUESTIONS:

1. Why is a hole, aperture, needed in a camera?
2. What is the job all cameras must do?
3. List 5 features all cameras must have.
4. Why are there so many different types of cameras?



(D) THE CAMERA BODY a box that houses various parts of the camera, protects the film from all light except that which enters through the lens when a picture is taken.

(E) THE DIAPHRAGM a light control device usually made of overlapping metal leaves, forms an adjustable hole, or aperture. It can be opened to let more light pass through the lens or partially closed to restrict the passage of light.

(F) THE SHUTTER the second light control, is a movable, protective shield that opens and closes to permit a measured amount of light to strike the film.

(G) THE LENS focuses the light rays from a subject and creates a reversed, upside-down image on the film at the back of the camera.

(H) THE FOCUSING CONTROL moves the lens back or forth to create a sharp image on the film.

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(A) VIEWING SYSTEM shows the scene the picture will cover, usually through a set of lenses or the picture-taking lens itself.

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(B) THE FILM receives the image of the object being photographed and records this image on its

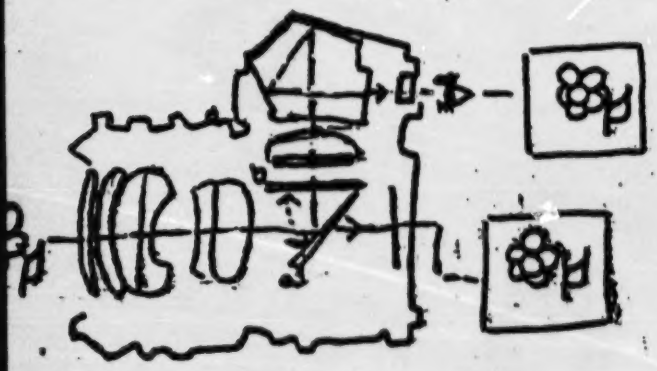
(C) THE FILM ADVANCE winds film from one spool to another in cameras using film rolls or cartridges in other cameras, which use sheets of film, there is a slot admitting one sheet at a time.

SINGLE LENS REFLEX

If you are looking for a camera that is compact size, light weight, uses inexpensive film and are willing to do the required fiddling that is unecessary with simple viewfinding cameras, then a single lens reflex camera will probably be the camera type for you. This is the most popular among amatures and professionals alike because of the film it uses. Most single lens reflexes accept 35 millimeter (1½ inches) wide film. This film is very economical, you can make a large number of pictures at minimum expense.

Obviously, the best way to see what the camera sees is to look right through the camera lens itself. This way you can decide how much every part of the scene will be in your picture. The single lens reflex camera has a mirror and a prism, which enables you to use the camera lens for composing and focusing pictures.

The key to the single lens reflex camera is the mirror.(a) Light coming in through the camera lens is reflected upward by this mirror to a viewing screen then through a five sided prism that turns the inverted image right side up and delivers it to the eye.



When a picture is taken, the mirror snaps up momentarily to position (b), permitting light to strike the film at the back of the camera. Through - the - lens viewing produces an image virtually identical with that produced on the film.

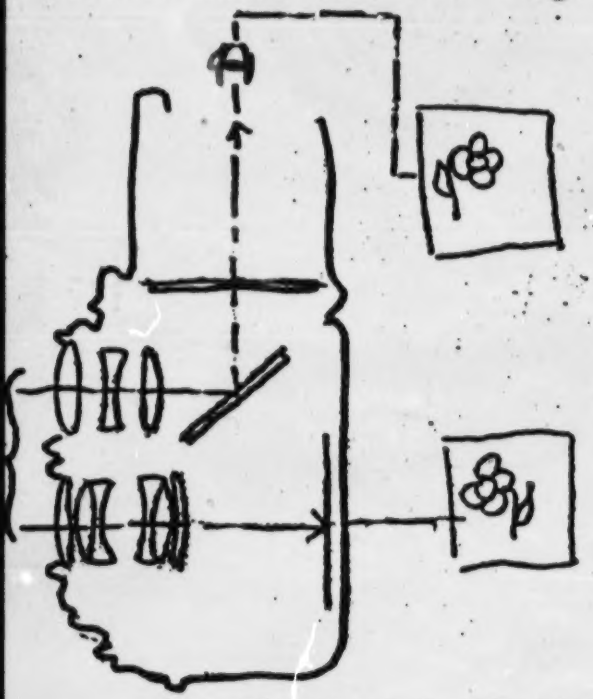
QUESTIONS

1. Why is the single lens reflex popular with amateurs and professionals?

2. What is the key to single lens reflex?

TWIN LENS REFLEX

The twin lens reflex, like the viewfinder camera, has separate viewing and picture - taking systems. Here they are stacked one over the other. The lower lens draws light to the film. The upper lens, along with the lower one draws light to a mirror (a) set at a 45 degree angle, which is reflected upward to a viewing screen (b). Like all mirror reflections the image appears reversed left to right. Unlike the single lens reflex camera, the mirror is fixed (does not move).



The principal problem with the twin lens reflex is parallax error (the difference between the view seen through the viewfinder and that recorded on the film). Another drawback is that the image projected on the viewing screen is reversed left to right, which takes some getting used to.

One advantage to the twin lens reflex is that since the photographer looks into the camera from the top, he can lower it to waist level or even place it on the ground - an awkward angle for an eye-level viewfinder. This camera is light enough and quick enough and quick-handling enough to be useful companions on a trip, or around the house.

QUESTIONS

1. What is the principal problem with the twin lens reflex cameras?

2. Name two advantages of the twin lens reflex cameras.

KODAK INSTAMATICS and POLAROID LAND CAMERAS

The real camera explosion has come since World War II with the astonishing success of two families of cameras for the amateur: the Kodak Instamatics and similar "do - everything - for - you" cameras of other manufacturers, and the Polaroid Land Cameras, named for Edwin H. Land, inventor of the first successful in - the - camera developing process. (Land was inspired to create the picture - in - a - minute camera by his daughter: When he was taking snapshots of her one day, she impatiently asked how soon she could see them and was heartbroken when he explained about the delay involved in developing and printing.)

QUESTIONS

1. When did the real camera explosion start?

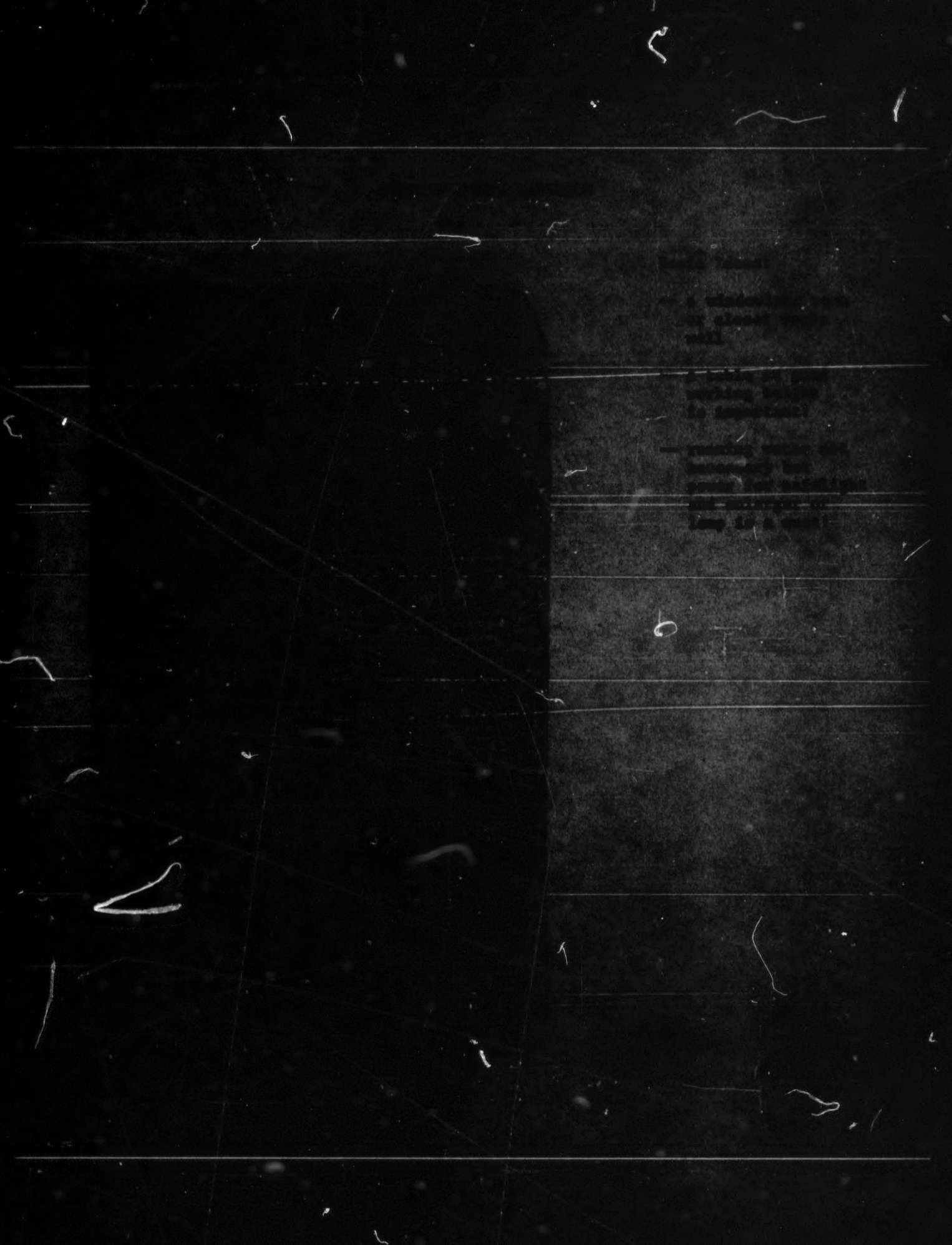
2. What inspired Edwin Land to create the in - the - camera developing process?

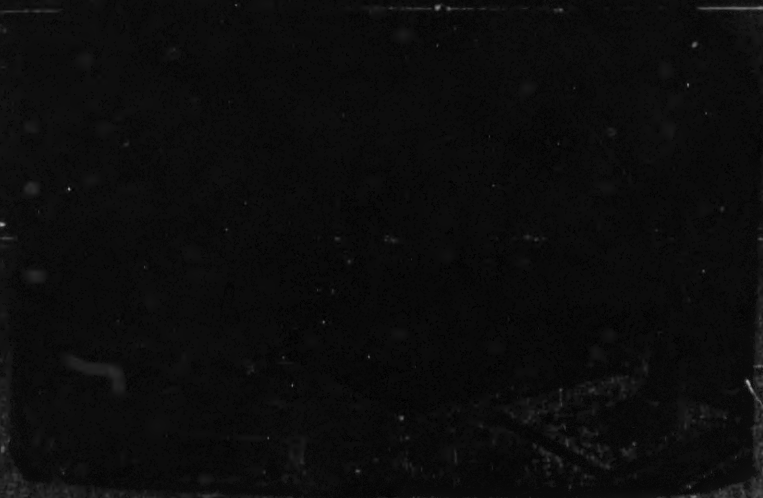
PHOTOGRAPHY WORD FIND

B N T W A T E R R I N S E T D C F S T O P S Z N
O A C E R O X E O G L X N H E I Q P U N N I O
X M E D E O A X F O R E T G V N U U E A O N I
O B J I M A N I R E M S M I E D A E P S N G T
O A B L A W S F W E A A E L L Y X S P I O L C
R C U A C U X E G R R N R E O E H O O M I E A
K K S X C N F R T A U N U F E O X L L P S L S
R G O O I C A N M O N O T A T T R C L L L E T
A R F D T L O G U M W D C S R Z A A A E U N N
D O B L A C K A N D W H I T E R X R G V M S I
N U R N M K C A D I D T P X T O M D N I E R R
E N E X O L Y K E T R E S R Z F Y L L E R E P
G D X A T N L R R A O E I I U Y R S S W U F T
A L I L U D X U E P T D I W H R R T S F S L C
T A F L A S H T X E G N O X S T O A E I O E A
I P X A S O N R P E U L D E S P R N C N P X T
V H E R Z I O E O S B P S I B N L C O D X M N
E R L A R M T P S E A N X A O X E E R E E L O
G A T P U A H A U Y E Q T N O R A L P R R I C
U G R U L G G N R L Z H L L A R A P M O E F A
D M U P B E I N E G M I P O O R C L M O V I E
N O T W I N L E N S R E F L E X L R O L O C R
C O N T R O L G N I T H G I L E C A B P R Z L

OVER EXPOSURE
ENLARGEMENT
SINGLE LENS REFLEX
TWIN LENS REFLEX
POLAROID
SIMPLE VIEWFINDER
CONTACT PRINTS
SNAPSHOTS
SLIDE
LIGHT
FILM
LENS OPENING
APERTURE
SHUTTER
F STOPS
FOCUSING
PROCESSING
DEVELOPER
STOP BATH
FIXER
WATER RINSE
PARALLAX
KODAK
NEGATIVE
DARKROOM
SAFELIGHT
ACTION
OXALID

AUTOMATIC CAMERA
BACKGROUND
BLOW UP
CARTRIDGE
CLOSE UP
CONTRAST
CROOPING
DIAPHRAGM
FLASH
MOVIE
PRINT
UNDER EXPOSURE
ZOOM LENS
COLOR
BLACK AND WHITE
PICTURE
BLUR
IMMAGE
LENSES
EYE
MIRROR
ART
DISTANCE
DEPTH
SUGJECT
BACKLIGHTING
CONTROL





PRICES OF PHOTOGRAPHIC SUPPLIES
AT SCHMITT PHOTO SERVICE SHOP IN EVANSVILLE

(April, 1980)

Darkroom apparatus --

- Negative Clips (12) $3.00
- 8 x 10 Tray $1.55
- Omit (canned air) $3.25
- Patterson tank and reel (self-feeding) $12.33
- B & J stainless steel tank (35 mm) $7.98
- Patterson stainless steel reel (35 mm) $4.25
- Premier safelight $14.41
- Brownie safelight $5.91
- Funnel (with filter) $2.25
- Print tongs (set of 3) $1.99
- Stirring paddle $1.16
- Thermometer $9.00

Film Materials --

- Daylight film loader: Premier $14.41
- Negative envelopes (glassine strip holds 6-35 mm or 126) Package $3.20

Enlarger --

- Bogen X-35A $100.00

Photographic papers --

Kodabrome	5 x 7	100 sheets	$12.45	
	8 x 10	25 sheets	7.18	
	8 x 10	100 sheets	24.91	
Agfa Brovira	8 x 10	25 sheets	9.56	
Polycontrast II Rapid RC,F	5 x 7	100 sheets	18.36	
Polycontrast II Rapid RC,F	8 x 10	100 sheets	40.12	
		25 sheets	7.69	(old price)

Chemicals --

- Tri-Chem pack (Dektol, Stop Bath, Fixer: 8 oz of each) $.98
- Microdol-X to make 1 gal $2.89
- Stop Bath (pt. container dilute before using) $2.00
- Fixer to make ½ gal $1.19
- Rapid fixer to make 2 gal $3.02
- Hypo clearing agent to make 1 gal $.98
- Dektol to make 1 gal $2.10
- Sepia toner to make 1 qt $1.02
- Photo-Flo to make 1 pt $2.55

<u>Blueprint Paper and Oxalid paper</u> are available from Delta Education, Box M, Nashua NH 03061. The materials are not too expensive, 25 sheets measuring 9 x 12 inches cost about $1.50.

EVALUATION

PROJECT PHOTO

At the completion of this project, you should be able to answer the following questions and define the terms listed. We will have a test on the items on Wednesday, April 30.

Sun Prints -

Which paper produces a light image on a dark background?

Answer: blueprint

Which paper produces a dark image in a light background?

Answer: oxalid

What chemical is needed to develop the oxalid paper?

Answer: ammonia

What chemical is needed to develop the blueprint paper?

Answer: peroxide

Know these terms:

opague
transparent
develop
light sensitive

Can Cameras -

What are the four necessary conditions for a camera?

Answer: light, film, aperature, shutter

How can a can camera negative be made into a positive?

Answer: In a darkroom, place a piece of photo paper face up on the enlarger's easel. Pat the negative face down on the paper. Cover with glass to hold flat. Turn on the enlarger light for approximately 30 seconds. Develop the picture.

If a can camera photo is overexposed, how does the picture appear?

Answer: All black

If a can camera photo is underexposed, how does the picture appear?

Answer: All white or nearly white

Know these terms:

aperature
shutter
depth of field
focus
darkroom
light sensitive paper
emulsion side of paper

Developing Film -

What are the steps in developing film?

Know these terms:

developer
fixer
rinse
hypo clearing agent
changing bag
developing tank

What would happen if the film was left in the developer too long?

Answer: It would be too dark.

What would happen if the film was exposed to light?

Answer: It would be dark

How do you find the information concerning developing time for a certain kind of film?

Answer: The information is provided with the film or available in a data book.

What effect does temperature have on the time necessary to develop film?

Answer: Warmer chemicals require less time.

History of Photography -

Matthew Brady was famous for his photographic work during what war?

Answer: Civil War

Who developed the first Kodak camera?

Answer: George Eastman

What camera made photography easily available to the public?

Answer: Kodak camera

What was the advantage of the Instantograph camera?

answer: It could take pictures of moving objects.

Which camera produced profile-like figures and eventually evolved into what we know as the photographic camera?

answer: Camera obscura

_____
student's name

PROJECT PHOTO CHECKLIST
April 14-30, 1980

Sunprints

__ oxalid

__ blueprint

Can Camera

__ Operational Camera

__ At least one successful photo

__Positive from negative

Pinhole Camera (per team of two)

__ Operational Camera

__Exposed Roll of film

__Developed Roll of Film

Developing/Enlarging

__Contact prints from pinhole camera

__Enlargement of negative

BIBLIOGRAPHY

Free Kodak publications:

AJ-3, "How to Process and Print Black and White Films" -- useful if making pinhole cameras.

AC-13, "Picture-Taking in Five Minutes" -- explains basic camera types and composition techniques.

AT-1, "Your Programs From Kodak" -- lists rental free movies which teach basic concepts of taking, developing photos.

AT-2, "Photography: How It Works" -- a good introduction to the principles behind how a camera operates.

AT-18, "Teaching Tips from Kodak" -- 275 ways to use photography in the classroom, covers all disciplines.

Excellent articles written for middle-school teacher in mind:

Galindez, Peter, "Focus on Color Photography," Science Activities, Spring, 1978, pp. 24-31.

Galindez, Peter, "Focus on Photography," Science Activities, March/April, 1977, pp. 8-13.